

IN THE TITLE

Please replace the title with the following amended title:

~~IMAGE PROCESSING APPARATUS AND COMPUTER READABLE STORAGE MEDIUM~~
HIERARCHICALLY COMPRESSING AND CODING AND STORING IMAGE DATA

IN THE SPECIFICATION

Please replace paragraph [0057] with the following amended paragraph:

[0057] At the original image input and output units shown in FIG. 1, the color space transform and inverse transform unit 101 is connected in most cases. For example, a transformation from the RGB colorimetric system made up of red (R), green (G) and blue (B) components of the primary color system or, from the YMC colorimetric system made up of yellow (Y), magenta (M) and cyan (C) components of the complementary color system, to the YUV or YCrCb colorimetric system or, an inverse transformation, is carried out in the color space transform and inverse transform unit ~~100~~ 101.

[0065] FIG. 5 is a diagram for illustrating the procedure for ordering the bit-planes. In the particular example shown in FIG. 5, an original image 90 (32 x 32 pixels) is divided into 4 tiles 90_{t0}, 90_{t1}, 90_{t2} and 90_{t3} each having 16 x 16 pixels. The sizes of the code block and the precinct at the decomposition level 1 (121) respectively are 4 x 4 pixels and 8 x 8 pixels. The numbers of the precincts and the code blocks are assigned in a raster sequence. In this particular example, numbers 0 to 3 are assigned to the precincts, such as 90_{p0}, 90_{p1}, 90_{p2}, and 90_{p3}, and numbers 0 to 3 are assigned to the code blocks, such as 90_{b3}. A mirroring method is used for the pixel expansion with respect to the outside of the tile boundary, and the wavelet transform is carried out by ~~[[a]]~~ an independent-function (5,3) integer transform filter to obtain the wavelet coefficients of the decomposition level 1 (121).

Please replace paragraph [0094] with the following amended paragraph:

[0094] FIG. 13 is a diagram showing other compressed codes stored by first through third level data storage units 34 through 36. FIG. ~~[[12]]~~ 13 shows a case where the first through third level data storage units 34 through 35 store the compressed codes (sub-bands) for the decomposition levels 1 through 3 shown in FIG. 3 in a non-overlapping manner. As shown in FIG. 13, the first level data storage unit 34 stores the sub-bands 1HL, 1LH, and 1HH of the decomposition level 1 in the HDD 15 of the server computer 2. The second level data storage unit 35 stores the sub-bands 2HL, 2LH and 2HH of the decomposition level 2 in the storage unit 46 of the client computer 4. The third level data storage unit 36 stores the sub-bands 3LL, 3HL,

3LH and 3HH of the decomposition level 3 in the storage unit 46 of a client computer 4 which is other than the client computer 4 storing the sub-bands 2LL, 2HL, 2LH and 2HH of the decomposition level 2. It is unnecessary to separately store the sub-band 2LL because the sub-band 2LL can be generated from the sub-bands 3LL, 3HL, 3LH and 3HH. Similarly, it is unnecessary to separately store the sub-band 1LL because the sub-band 1LL can be generated from 2LL (3LL, 3HL, 3LH and 3HH), 2HL, 2LH and 2HH. In this case, it is possible to reduce the storage capacity required to store the compressed codes, compared to the case shown in FIG. 12.

Please replace paragraph [00100] with the following amended paragraph:

[00100] In this embodiment, the compressed codes are distributed for each of the hierarchical layers (levels) and stored in the server computer 2 and the client ~~computes~~ computers 4 (including MFP 7) that are distributed within the network 3. However, it is not essential to store the compressed codes that are distributed for each of the hierarchical layers (levels) in a plurality of apparatuses, and the compressed codes that are distributed for each of the hierarchical layers (levels) may be stored within a single apparatus, such as the server computer 2.

Please replace paragraph [00101] with the following amended paragraph:

[00101] In a case where the compressed codes are distributed for each of the hierarchical layers (levels) and stored in the server computer 2 and the client ~~computes~~ computers 4 (including MFP 7) which are distributed within the network 3, the image data processing cannot be carried out unless the power of all of the concerned apparatuses (in this case, the computers 2 and 4) is turned ON. Hence, it is desirable to confirm that the power of all of the concerned apparatuses is turned ON before starting the image data processing. If the power of all of the concerned apparatuses is not turned ON, a determination such as not starting the image data processing may be made.

Please replace paragraph [00112] with the following amended paragraph:

[00112] FIG. 15 is a diagram for illustrating a division of a tile image. FIG. 15 shows a case where the tile image dividing unit 50 divides a document image data into 3 tiles T1 through ~~R3~~ T3 depending on the type of region (or type of image data). In this case, if the type of region is “picture (photograph or the like),” the region is regarded as the tile T1. The tile T1 is coded into the compressed codes (sub-bands) 1LL, 1HL, 1LH and 1HH of the decomposition level 1 shown in FIG. 3 by the first compressed code creating unit 51, and stored in the HDD 15 of the server computer 2 by the first data storage unit 54. If the type of region is “character,” this region is regarded as the tile T2. The tile T2 is coded into the sub-bands 2LL, 2HL, 2LH and 2HH of the decomposition level 2 by the second compressed code creating unit 52, and stored in the storage unit 46 of the client computer 4 by the second data storage unit 55. In addition, if the type of region is “title,” this region is regarded as the tile T3. The tile T3 is coded into the sub-bands 3LL, 3HL, 3LH and 3HH of the decomposition level 3 by the third compressed code creating unit 53, and stored in the storage unit 46 of a client computer 4 that is other than the client computer 4 that stores the compressed codes of the tile ~~T2~~ T3, by the third data storage unit 56. In this case, it is possible to suppress the storage capacity required to store the compressed codes of the tiles T1 through T3 to a small value.

Please replace paragraph [00113] with the following amended paragraph:

[00113] FIG. 16 is a flow chart for illustrating storage of the compressed codes depending on the type of region. The process shown in FIG. 16 is carried out by the CPU 11 of the server computer 2. In FIG. 16, a step S1 decides whether the type of region of the document image data to be stored is the “title,” “character” or “picture (photograph or the like).” The type of region may be determined by known methods, such as a determination based on information which is related to the type of region and is input by the user from the input unit 44 of the client computer 4, a determination based on a position of the region within the document image, and a determination based on a label added to the document image data and indicating the type of each region within the document image. If the type of region is “picture (photograph or the like),” a step S2 regards this region as the tile T1, codes the tile T1 into the compressed codes (sub-bands) 1LL, 1HL, 1LH and 1HH of the decomposition level 1 shown in FIG. 3 by the first compressed code creating unit 51, and stores the compressed codes 1LL, 1HL, 1LH and 1HH in the HDD 15 of the server computer 2 by the first data storage unit 54. If the type of region is “character,” a

step S3 regards this region as the tile T2, codes the tile T2 into the sub-bands 2LL, 2HL, 2LH and 2HH of the decomposition level 2 by the second compressed code creating unit 52, and stores the sub-bands 2LL, 2HL, 2LH and 2HH in the storage unit 46 of the client computer 4 by the second data storage unit 55. In addition, if the type of region is “title,” a step S4 regards this region as the tile T3, codes the tile T3 into the sub-bands 3LL, 3HL, 3LH and 3HH of the decomposition level 3 by the third compressed code creating unit 53, and stores the sub-bands 3LL, 3HL, 3LH and 3HH in the storage unit 46 of a client computer 4 that is other than the client computer 4 that stores the compressed codes of the tile ~~T2~~ T3, by the third data storage unit 56.

Please replace paragraph [00115] with the following amended paragraph:

[00115] If the type of source information terminal equipment is the portable telephone, a step S12 regards the region of the image data to be stored as the tile T1, codes the tile T1 into the compressed codes (sub-bands) 1LL, 1HL, 1LH and 1HH of the decomposition level 1 shown in FIG. 3 by the first compressed code creating unit 51, and stores the compressed codes 1LL, 1HL, 1LH and 1HH in the HDD 15 of the server computer 2 by the first data storage unit 54. If the type of source information terminal equipment is the PDA, a step S13 regards the region of the image data to be stored as the tile T2, codes the tile T2 into the sub-bands 2LL, 2HL, 2LH and 2HH of the decomposition level 2 by the second compressed code creating unit 52, and stores the sub-bands 2LL, 2HL, 2LH and 2HH in the storage unit 46 of the client computer 4 by the second data storage unit 55. In addition, if the type of source information terminal equipment is the personal computer (PC), a step S14 regards the region of the image data to be stored as the tile T3, codes the tile T3 into the sub-bands 3LL, 3HL, 3LH and 3HH of the decomposition level 3 by the third compressed code creating unit 53, and stores the sub-bands 3LL, 3HL, 3LH and 3HH in the storage unit 46 of a client computer 4 that is other than the client computer 4 that stores the compressed codes of the tile ~~T2~~ T3, by the third data storage unit 56.

Please replace paragraph [00117] with the following amended paragraph:

[00117] If the decision result in the step S21 is NO, a step S23 decides whether or not the storage method is set to the medium resolution. If the decision result in the step S23 is YES, a step S24 regards the region of the image data to be stored as the tile T2, codes the tile T2 into the

sub-bands 2LL, 2HL, 2LH and 2HH of the decomposition level 2 by the second compressed code creating unit 52, and stores the sub-bands 2LL, 2HL, 2LH and 2HH in the storage unit 46 of the client computer 4 by the second data storage unit 55. In addition, if the decision result in the step S23 is NO, it is determined that the storage method is set to the low resolution, and the process advances to a step S25. The step S25 regards the region of the image data to be stored as the tile T3, codes the tile T3 into the sub-bands 3LL, 3HL, 3LH and 3HH of the decomposition level 3 by the third compressed code creating unit 53, and stores the sub-bands 3LL, 3HL, 3LH and 3HH in the storage unit 46 of a client computer 4 that is other than the client computer 4 that stores the compressed codes of the tile ~~T2~~ T3, by the third data storage unit 56.